

11-12 Simplify each expression. NO calculator needed.

1.  $\log_5 1$

2.  $\log_8 8$

3.  $\log_5 \frac{1}{625}$

4.  $2\log_{\frac{1}{3}} 9$

5.  $\log_6 \sqrt[3]{36}$

6.  $\log_{\sqrt{2}} 4$

7.  $6\ln\sqrt{e}$

8.  $10^{\log 4}$

9.  $\log 20 + \log 5$

10.  $\log_4 48 - \log_4 3$

11.  $5^{\log_5 6 + \log_5 7}$

12.  $\log_{\frac{1}{3}} 9$

13-24, Solve each equation. Round your answers to three decimal places if necessary.

13.  $\frac{1}{64} = 16^{8x+2}$

14.  $e^x = \frac{4}{5}$

15.  $\frac{650}{1+e^{-x}} = 600$

16.  $2^{2x} - 7(2^x) + 12 = 0$

17.  $3\ln(5x)=15$

18.  $\log_5(4x - 12) = 2$

19.  $\log_2 x + \log_2(x + 6) = 4$

20.  $2\log x = \log 9$

21.  $\log_2(x + 4)^3 = 6$

22.  $8^{x^2-2x} = \frac{1}{2}$

23.  $4^x - 2^x = 0$

24.  $\log_2 8^x = -3$

25-28, Write each expression as a single logarithm. (condense)

25.  $3\log_5 x + 4\log_5 y - \frac{1}{3}\log_5 w$

26.  $\log \frac{x^2+2x-3}{x^2-4} - \log \frac{x^2+7x+6}{x+2}$

27.  $\log_3 x + \log_3 9 + \log_3 (x^2 + 1) - 2\log_3 (5x)$

28.  $3\log_a x + \log_a (x^2 - 1) - 4\log_a (x + 1)$

29-32, Write each expression as a sum and or difference of logarithms. (expand)

29.  $\ln(x^2\sqrt{1-x})$

30.  $\log_6 \left( \frac{x^3}{x^2-4} \right)$

31.  $\log_2 \frac{\sqrt{3x(2-x)}}{x^4}$

32.  $\log_4 \frac{x^3\sqrt{x^2+1}}{(x+1)^4}$

33-36, evaluate and round each answer to three decimal places.

33.  $\log_{\sqrt{2}} 7$

34.  $\log_7 e$

35.  $3000(3^{-1.3})$

36.  $\frac{3}{4}e^{1.9}$